



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---|----------------------------|
| 10/728,393 | 12/04/2003 | Z. Jason Geng | 40398-0005 | 9234 |
| 20480 | 7590 | 05/23/2008 | | |
| STEVEN L. NICHOLS RADER, FISHMAN & GRAVER PLLC 10653 S. RIVER FRONT PARKWAY SUITE 150 SOUTH JORDAN, UT 84095 | | | EXAMINER PETERSON, CHRISTOPHER K | |
| | | | ART UNIT 2622 | PAPER NUMBER |
| | | | MAIL DATE 05/23/2008 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/728,393

Applicant(s)

GENG, Z. JASON

Examiner

CHRISTOPHER K. PETERSON

Art Unit

2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-64 is/are pending in the application.
4a) Of the above claim(s) 1-31 and 37-64 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 32-36 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 12/04/2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Claims 1 -31 and 40 – 59 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 2/28/2008.

Examiner disagrees with this election. Examiner believes claims 37 – 39 and 60 – 64 should also be withdrawn.

Claim 60 cites the limitation “a plurality of monochromatic sensors disposed around an object”. The applicant’s specification does not teach a plurality of monochromatic sensors disposed around an object in the elected species (Species 3: Figs. 5A and 5B). This limitation pertains to Figure 10 of the specification. As shown in FIG. 10, a system (1000) is presented including multiple 3D cameras having sensors (1020) with different non-overlapping bandwidths positioned around an object to be imaged (1030). Each sensor (1020) may collect 3D data regarding the object to be imaged (1030) from different views using the above-mentioned high speed imaging methods (Para 52 of Applicant’s Specification).

Claim 37 cites the limitation “an array of closely spaced light emitting diodes configured to generate a high density projection pattern”. The applicant’s specification does not teach an array of closely spaced light emitting diodes configured to generate a high density projection pattern in the elected species (Species 3: Figs. 5A and 5B). This

limitation pertains to Fig. 6 in the applicant's specification. In addition to the video projectors previously mentioned (**light wheel of Fig. 5A**), an array of LEDs (610) can be economically built to produce narrow-band pattern projections (640, 650, 660) as illustrated in Figure 6. As shown in Figure 6, a 3D imaging system (600) may include an array of closely spaced RGB LEDs (610) formed in a video projector (Para 44 of Applicant's Specification).

Applicant has selected Species 3: Figs. 5A and 5B (Remarks pg 18). Therefore claims 37 – 39 and 60 – 64 will be added to the withdrawn claims, as being drawn to a nonelected species (Species 4: Fig. 6 and 9:Fig. 10). Claims 37 – 39 and 60 – 64 will not be analyzed.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 32 – 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Hasegawa (US Patent # 5,014,121).**

As to claim 32, Hasegawa (Fig. 1) teaches a high speed 3D surface imaging camera comprising:

- a light projector (light source lamp 9) for selectively illuminating an object to generate 3D image data (Col. 4, lines 39 – 46);
- an image sensor (image sensor 4) configured to receive reflected light from said object and to generate three separate color image data sets (frame memory 20(R), 21(G), and 22(B)) based on said reflected light (Col. 4, lines 16 – 33); and
- means for generating sequential color projections (filter disk 8) from said projector (9) onto said object to be photographed. Hasegawa shows in figure 4 the filter disc (8) is constructed in such a way that filters 8a, 8b and 8c having such spectral transmittances as will transmit there through only R light, only G light and only B light, respectively, are arranged at an equal interval from each other on a same circumference (Col. 5, line 65 – Col. 6, line 13).
- wherein said image sensor (4) is configured to eliminate cross talk between said sequential color projections (8) by allowing for a sequential exposure of said image sensor (4) within a single frame cycle, said sequential exposure corresponding with said sequential color projections (8) (Col. 4, line 60 – Col. 5, line 35). Hasegawa teaches a timing structure shown in figure 2. The filter disc (8) rotates and produces a signal PS once per revolution. The PR signal causes the CCD to read out the specific color and multiplexer (18) directs the image data to the proper frame memory (20(R), 21(G), and 22(B)). By sequentially projecting a

specific color (RGB) and synchronizing the readout Hasegawa eliminates cross talk between the three colors.

As to claim 33, Hasegawa (Fig. 7) teaches the high speed 3D surface imaging camera of claim 32, wherein said image sensor comprises a plurality of charge-coupled device (CCD) sensors (Col. 6, line 65 – Col. 7, line 12). Hasegawa teaches a 3-color separation prism (34') in an image pickup device of the 3-CCD system.

As to claim 34, Hasegawa (Fig. 7) teaches the high speed 3D surface imaging camera of claim 33, wherein said plurality of CCD sensors comprises 3 CCD sensors (Col. 6, line 65 – Col. 7, line 12). Hasegawa teaches a 3-color separation prism (34') in an image pickup device of the 3-CCD system.

As to claim 35, Hasegawa (Fig. 5) teaches the high speed 3D surface imaging camera of claim 32, further comprising a computing device (reading out gate signal generator 25, gate signal generator 19, and synchronizing signal generator 31) communicatively coupled to said image sensor (4) wherein said computing device (25, 19, and 31) is configured to combine said separate color image data (20(R), 21(G), and 22(B)) sets into a composite Rainbow-type image of said object Col. 4, line 62 – Col. 5, line 35). Hasegawa teaches that the reading out gate signal generator produces the signal to readout the specific color by the CCD (4). The gate signal generator (19) produces a timing signal to the multiplexer (18) and a signal to the synchronizing signal generator (31). The respective color signals which have been accumulated in these respective frame memories (20(R), 21(G), and 22(B)) are read out by the actions of a synchronizing signal generator (31), and they are integrated together as they are

transferred either directly or passed through a delay circuit (32 or 33), and further through a D/A converter, to thereby be displayed in color on a screen of a color TV monitor (23) (Col. 5, lines 2 – 9).

As to claim 36, Hasegawa (Fig. 4) teaches the high speed 3D surface image camera of claim 32, wherein said means for projecting sequential color projections (8) comprises one of a rotatable color wheel (8), a deformable mirror, or a sequential RGB light emitting diode array (Col. 5, line 65 – Col. 6, line 13).

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nagasaki (US Patent # 4,584,606) cites multiple CCDs, a color wheel for sequential color projection, and a controller to combine the images into one image.

Yamada (US Patent # 4,875,091) cites an object which is sequentially illuminated by light having wavelengths different for each of several fields is imaged using an X-Y addressed solid state imaging device.

Hattori (US Patent # 5,995,136) cites a frame sequential type imaging apparatus for obtaining high resolution object image by irradiating frame sequential light on the object, photo-electrically converting the object image and processing signals by a solid state imaging device.

Lim (US Patent # 7,092,105) cites a method and apparatus for measuring the three-dimensional surface shape of an object using color information of light reflected by the object.

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER K. PETERSON whose telephone number is (571)270-1704. The examiner can normally be reached on Monday - Friday 6:30 - 4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NgocYen Vu can be reached on 571-272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/728,393

Page 8

Art Unit: 2622

/Timothy J Henn/

Primary Examiner, Art Unit 2622